Spatial and Temporal Variations in Magnetization of the oceanic Crust Near the Pitman Fracture Zone in the South Pacific

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Data from a dense Hydrosweep, magnetic, gravity and seismic survey of a flowline corridor across the Pacific-Antarctic Ridge at the Pitman Fracture Zone (FZ) provide an opportunity to examine the variations in magnetization of the oceanic crust over a relatively large area. Two long flowlines (A30 on the Antarctic plate 10 A33 on the Pacific plate), one on each side of the FZ, were inverted 10 obtain the variation of magnetization with age. Magnetization variations of several hundred km wavelength (1 O-X) m .y.) arc indicated by the inversion. The geophysical significance of these variations is discussed in the context of the limitations of the data.

A set of shorter profiles (ridge axis to 12 m .y.) located over an area of 100% Hydrosweep coverage reveal the spatial variations in anomal y amplitude related to changes in crustal thickness and the composition and fractionation of the magma. These profiles document the, slow secular decay of magnetization away from the ridge crest that has been observed in many locations. High amplitudes are observed over the thin crust adjacent to the FZ, indicating enhanced crustal magnetization, probably the result of greater degrees of magma fractionation against the cold edge of the older plate. An enigmatic magnetization high is located over the northern ridge axis, extending to the west over crust of age 5 m.y. This highly magnetic zone is truncated abruptly east of the ridge, coincident wilh a zone of distrubed seafloor fabric. Another, presumabl y related, lobe of high magnetization is located cast of this truncated boundary extending out to approximately the same age as the western lobe. These observations, combined with gravity and detailed swath bathymetry, allow the variability of the source layer of marine magnetic anomalies to be examined.